

Notice of Allowability

Application No.

09/994,508

Examiner

Steven H. Rao

Applicant(s)

KIM ET AL.

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 18 January 2005.
2. ☒ The allowed claim(s) is/are 1,2,4-6,8-17,19,21 and 22.
3. ☒ The drawings filed on 27 November 2001 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

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Response to Amendment

Applicants' amendment filed on December 17, 2005 has been entered and forwarded to the Examiner on January 18, 2005.

Applicants' supplemental amendment faxed on March 11, 2005 has been entered on March 15, 2005.

Therefore claims 1,11,15 as amended by the amendment and claims 2,4-6,8-10,12-14 and 16-19, and 21-22 as previously recited are currently pending in the Application.

Claims 3,7,18,20 and 23-24 have been cancelled by the amendment.

Allowable Subject Matter

Claims 1,6, 8-10,12-14, 16-22 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitation of the dependent claims, in such manner that a rejection under 35 U.S.C. 102 or 103 would be proper. The prior art fails to teach a combination of a method of manufacturing a semiconductor device having a low dielectric interlayer insulation layer including the steps of installing a semiconductor substrate in a chamber, introducing a layer formation source gas into the chamber, the layer formation source gas being selected to provide atoms used in forming a silicon oxycarbide layer on the substrate, the layer formation source gas comprising at least one of : (i) at least one of N₂O and O₂ for supplying oxygen, (ii) a gas containing a methyl silane group selected from the

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group consisting of a gas containing a mono ethyl silane group, a gas containing a dimethyl silane group, a gas containing a trimethyl silane group, and a gas containing tetramethyl silane, and (ii) another organic silicon gas, introducing a first plasma source gas into chamber, performing plasma-enhanced chemical vapor deposition (PECVD) on the substrate in the chamber while the layer formation source gas and the first plasma source gas are being introduced into the chamber at a temperature of about 300 to 400 degrees C, the PECVD resulting in completely forming a silicon oxycarbide layer as the low dielectric interlayer insulation layer on the substrate, and introducing a second plasma source gas into the chamber without the layer formation source gas at a temperature of about 250 to 400 degrees C, the second plasma source gas being at least one gas selected from the group consisting of He, Hydrogen, N_2O , NH_3 , N_2 , O_2 , and Ar, using the second plasma source gas, treating the completely formed silicon oxycarbide layer with plasma and stacking photo resist on the plasma-treated oxycarbide layer and patterning the resultant structure,

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (571) 272-1718. The examiner can normally be reached on 8.00 to 5.00.

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The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

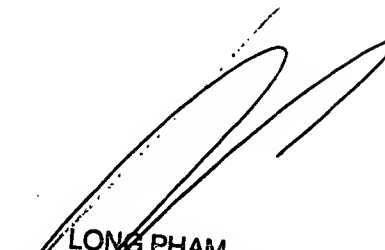
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H Rao

Patent Examiner

March ²⁶/₁₇, 2005.



LONG PHAM
PRIMARY EXAMINER